



Research Brief

June 2005

Connecting the Silos: Using Governance Models to Achieve Data Integration

The Challenge of Integration

In today's challenging "do more with less" environment, it has become incumbent upon government leaders to find innovative, practical, and cost effective ways to meet the growing information sharing needs of their constituents, both internal and external. While technology has been called upon to meet many of these needs, its effectiveness in meeting the goals of cross-boundary data integration are tempered by the level of planning and governance that are required to produce the desired results.

Information integration in government can raise a variety of issues, including information ownership (once shared), privacy and access, data quality, security, legal concerns, statutory requirements, trust, business operations, and the overall culture of agency interactions and public relations. All must be addressed in order for an integration initiative to be successful. Silos of information that exist to serve the programmatic and service delivery needs in justice, public health, homeland security, environmental protection, social services, and others, could be made accessible across the enterprise in a secure, structured and collaborative manner. Such access could provide benefits that outweigh implementation costs, such as reduction of redundant data entry, improved data integrity, increased accuracy and immediacy, and improved decision-making.

Integration Defined – **Integration** is a term that has as many definitions as there are reasons to achieve it. At its most basic, it provides for the electronic sharing of information between two or more databases or systems via a standard message format, such as Extensible Markup Language (XML), which has become the de facto standard for government data sharing and information exchange. That sharing can be achieved by extracting data from each source and storing it centrally, or by retrieving data from each source on an as needed basis. Further, data is normally shared in one of two ways: (1) for informational or intelligence gathering purposes usually accessed by a query, or (2) it can be exchanged between data sources for use within a specific application. On a more contextual level, integration is focused on the sharing of data across organizations and domains, within an established enterprise, based upon standard formats.

Cross boundary data integration is challenging. To effectively and efficiently provide access to information residing in repositories that are not currently accessible necessitates a structured approach that transcends technology. Governance provides that structure. At its most basic, governance is a shared set of expectations for an organization or enterprise. The level of detail and formality of governance models can vary widely; however, an effective governance model guides decision makers in building an organizational structure that effectively supports the

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planning, development, oversight, and fiscal management activities that promote the enterprise. The creation of a governance model requires a highly collaborative environment where trust has been established and agencies agree to share information to solve a particular problem.

More than Just a Technology Issue

The technology that provides the bridge for information sharing to take place is but one piece of the puzzle and is usually the easiest part. In order to be successful in an integration initiative, a vision and business case needs to be articulated; a collaborative and trusting relationship between participants needs to be established; an outreach to community and funding sources must occur; and a model for program management must be defined. Above all there is the need for a **governance structure**. While well thought out and effective governance is an important dimension to any large scale public sector initiative, it is even more so in one involving integration, as it will most likely involve many combinations of organizations, jurisdictions, or domains. More than this, integration is not just about sharing data, it is about sharing information to achieve common business purposes across disparate entities. Building a governance structure allows a stable process to be applied to unique integration requirements. Furthermore, governance enables the consideration of integration initiatives across the full spectrum of stakeholder participants.

Keys to Successful Integration

Governance – An effective governance model guides decision makers in building an organizational structure that effectively supports the enterprise. Governance models include formal and informal components: **Formal aspects** include memorandums of understanding (MOUs), charters, statutes, and administrative directives. **Informal aspects** include collaboration, culture and effective communication. Governance models also affect the following governmental functions: **Organizational** – Vision, strategic planning, centralized procurement; **Technology** – Shared technology; **Politics** – Constituent and social focus, communication; **Finance** – Grants and budget management; **Legal** – What can and cannot be shared across the different agencies/domains; what statutory limitations are in place regarding system and data management and custody.

Common Objectives – Information sharing can only happen where organization leaders agree on the purpose and potential for sharing to achieve business outcomes. Chief information officers (CIOs) play a critical role in initiating legislative and executive policy changes, and only through legislative and executive support can individual agencies prepare for information integration. It is therefore incumbent upon CIOs to explain the common objectives of better communications and more effective use of information when it is shared.

Business Process – CIOs need to be cognizant of the budgetary and funding implications of data integration. As agencies are typically funded for their particular mission, not for the sharing of data or information, a reliable source of continuous funding must be identified. (*See section on, “What CIOs Need to Know,” “Funding.”*)

Communications – Communication is crucial to a successful implementation. Through periodic meetings with organization heads and staff, the CIO can help instill a sense of common goals and trust within and between the organizations involved in the effort.

Common Terminology and Vocabulary – Organizations within an enterprise must not only have common standards for sharing information, but must review common terminology and vocabulary used in identifying data sets and protocols to avoid inadvertent misunderstandings or glitches in data transfer. States need to agree on core data definitions. A common command may have entirely separate meanings to different organizations. Also, different naming protocols for common data sets, for example, something as simple as using Lane or Ln. on a street address, need to be standardized for effective data transfer to take place.

Data Quality – Data quality is a critical factor not only for effective reporting and data analysis, but for trust among organizations as well. If data is of insufficient quality, then the decision makers who receive the information cannot trust the results. Organizations should work together to update legacy databases, remove inaccuracies, standardize common values, and cleanse data to create consistent, trustworthy information, thus improving the accuracy of decisions by ensuring a consistent version of the truth. Providing the legal authority to decision makers to facilitate these corrections is vital to the process.

Technology Standards – A common vocabulary is needed to facilitate cross boundary information exchange. Extensible Markup Language (XML) has become the de facto standard for government data sharing. The Global Justice XML Data Model (GJXDM) is the standard being widely implemented by government agencies at all levels for inter-organizational communication and data sharing of public safety and criminal justice information. Another standard, Web services and service oriented architecture (SOA), was recently implemented by the state of Wisconsin to allow interagency access to legacy human services data housed on mainframes. All organizations within an enterprise must have the proper equipment and data architecture to facilitate these technologies as part of a data sharing system.

Architecture – Line of business verticals, such as human services, justice, and environmental management, though maintained in silos within agencies, have an opportunity and obligation to unify around common data and integration standards, providing opportunities to integrate horizontally and vertically. Enterprise architecture (EA) can provide the organizational, procedural and process structure.

Privacy Policy – Concerns over the security of information once it leaves its point of origin create a barrier to information sharing that can hamper the cooperation among agencies. Sourcing agencies must be assured that the same privacy and security measures they take to protect the data in their possession will apply once the data are shared in a broader community. Sharing the data can be viewed as “losing control of the data,” making sourcing agencies skeptical of integration efforts. The laws and regulations governing the organizations involved in the integration effort must be reviewed and respected. In addition, comprehensive and specific memorandums of understanding (MOUs) must be developed and implemented.

Strong Security/Trust Model – To break down the cultural barriers that can hamper the cooperation among agencies to share information, a strong trust model must be established. Perhaps the most important component is a security and privacy policy. A well developed security policy for identity management has the following five components: (1) identity, (2) authentication, (3) authorization, (4) access control and entitlement, and (5) an auditing capability. **Identity** is a collection of attributes or characteristics that uniquely describe an object or entity. The identity is how a person or entity is known and recognized. The 9/11 Commission reports emphasized the need for the federal government to set standards for the issuance of birth

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certificates and sources of identification, such as driver's licenses, and requires the cross matching of birth, death, and driver's licensing databases. This would require the capture of new data elements and better integration of systems and business processes.¹

Once identity is established, **authentication** must take place. Authentication is the process by which an entity or object's identity is challengeable and validated. Next, **authorization** is a set of processes and controls used to restrict the resources an authenticated entity or object is allowed to access. The entity or object must have explicit authorization from the "system" to perform a query or other form of information exchange. **Access control and entitlements**, or role-based security, is assigned according to the entity or user's authorization. Access control and entitlements are mechanisms that allow the provision of fine-grained access control down to the functions users are able to perform within a given application. Users can be categorized by roles for role-based access control. The final component of trust is the ability to **audit**. This function provides the ability to track the behavior of an identity and verify compliance with agreed authorizations. Without the key components of a trust model, agencies and individuals are hesitant to share critical information and may question who is accessing their information and how that information is being used. *(See section on Pennsylvania's JNET as an Agent of Delegated Trust).*

Benefits of Successful Integration

Improved Communications – One of the most important benefits of integration is the improvement of communications between organizations. In an integrated environment, information flow from one agency to the next is greatly improved, potentially decreasing the chances that needed information will "fall through the cracks." More information will also likely be transferred between the agencies than might otherwise be the case because the data flows and formats are standardized.

Improved Decision Making – Improving the flow of information from one organization to another can also lead to better decision-making. When complete and up-to-date information is available to the decision maker, improved decisions should result. For example, when a judge has access to complete and accurate offender data, he or she can make a more informed sentencing decision. As another example, when a human services employee has all the relevant data on an individual seeking help or benefits, he or she can make a much more informed decision on how best to assist the client.

Resource Savings – Another important benefit of integration is the potential for cost savings. Any process or project that reduces redundant effort and leverages existing or previous efforts will save time and money. For an integrated system to be beneficial, it must demonstrate and ultimately realize cost savings. Integration of information systems provides an opportunity for cost savings by potentially creating economies of scale and by reducing operating expenses. Integration may result in a reduction in the need for each organization to produce its own records. Files and critical documents can be automatically processed and electronically delivered to those organizations or individuals when and where they need them. In addition to paper related costs, there are also high staff costs associated with the generation of duplicate records necessary for various processes, organizations and individuals. Beyond cutting costs, integration, when tied to business process review and re-engineering across boundaries, offers the potential for leveraging

¹ The National Commission on Terrorist Attacks upon the United States, 2004.

improved service, automating burdensome activities, and improving customer and staff morale through streamlined processes, thereby enabling more attention to be paid to using the data rather than finding the data.

Enhanced Service Delivery – With the current trend toward “one-stop shops” and constituents’ expectations of a seamless experience when dealing with government, the need to share information is quickly becoming a necessity. Integration helps governments more effectively use and deliver information and services within and across domains. This need crosses governmental levels, as well as domain, agency and organizational boundaries.

This reality provides a number of challenges to those either planning or involved in an integration initiative. One of the most important challenges is effective communication to those planning to participate. A fundamental task for those planning an initiative is to identify a prevailing need to integrate or share information across the agencies. This task is critical as the need must strike a resonant chord within each of the agencies that will eventually share data. Needs will vary according to the environment, but what is most important is that each identified agency shares the need in varying degrees and with varying mind sets, and that the governance leader molds the message independently to each one while maintaining the needs and message of the enterprise. This is not an easy task and one that can take a significant amount of time and energy to develop, communicate effectively, and justify when challenged. Within the message, the identification of the salient benefits and efficiencies that each participant may experience, as well as the associated risks, costs, and liabilities, must be articulated at a high level.

What is being done in the states to develop data integration governance models?

The need to share information across critical data sources has transcended all levels of government and has spawned a series of efforts at the state level aimed at implementing a wide variety of integration objectives. Key to these efforts is the clear articulation of goals and the establishment of effective governance models.

Two states, New Jersey and Pennsylvania, have developed governance models to address their specific domain issues. New Jersey’s Data Management Council takes an enterprise wide approach to developing an integration plan, while the Pennsylvania Justice Network (JNET) Trust Model enforces trust mechanisms on behalf of participating agencies.

The New Jersey Data Management Council

Given that states must manage a core of common data at the enterprise level, the state of New Jersey formed a Data Management Council (DMC) in June 2000 to provide for a systematic review of enterprise data policies and practices. The council developed a set of standards and has oversight by the chief information officer (CIO) and technical support from the New Jersey Office of Information Technology (OIT). The adoption of common data standards was essential to the success of the data sharing initiative. These standards formed the building blocks of collecting, storing, managing and assuring proper privacy of and access to data on an enterprise basis.

The DMC consists of appropriate representatives from each agency, along with representatives from OIT and the CIO’s office. The Council selects a chairperson from among its members. The

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Council supports, and receives support from, professional staff assigned to enterprise data management roles. The Council makes its recommendations to the IT Leadership Team after review by the IT Coordinating Team.

The Council oversees the establishment and maintenance of Data Object Naming Conventions, Meta-data Standards, Data Dictionary Standards and Data Exchange Standards for the enterprise. The Council also oversees the definition and usage of enterprise and affinity data. The Council is responsible for the creation and maintenance of the Enterprise Data Model and Enterprise Data Management Framework, as well as the implementation and management of enterprise data solutions.

The DMC also established and coordinated work groups to study, evaluate, develop and recommend Enterprise Data implementation solutions for consideration by the CIO and the Information Technology Leadership Team.

** Information on the NJ Data Management Council provided by the NJ Office of Information Technology (OIT). Contact Dan Paolini, Director, Data Management Services, NJ OIT; Ph: 609-777-3771; E-mail: daniel.paolini@oit.state.nj.us.*

Pennsylvania's JNET as an Agent of Delegated Trust

Pennsylvania's Justice Network (JNET) is a secure system that allows users to access criminal data, mug shots, driver's license photos and other law enforcement data. It is available to federal and state agencies and local police departments.

JNET as a medium enforces trust mechanisms, on behalf of participating agencies, by accessing only the information authorized, identifying, validating and auditing all users and systems accessing information and services, and delivering or presenting the information securely and un-tampered to authorized recipients.

JNET and by extension, the JNET office, is therefore a delegate of trust that is predetermined among participants. Without the agencies first trusting each other, JNET would itself be limited in its functions as an integrated broker of trusted relations and information.

This trust model – agencies first specifying and authorizing all components of trust among each other, and then delegating that to JNET – should still be applied when future decisions are made concerning prospective partners, along with their systems and users. This model is not transitive, that is, if current partners delegate trust to JNET, and JNET implicitly or explicitly decides to trust a prospective partner, then the conclusion should not be made that the current partners trust the prospective partners with their information and services. This means that current partners should not expect JNET to make the final decisions on the trust to be provided. However JNET can assist as a delegate, to provide the necessary assistance in the decision making process by way of suggestions, criterion, and impact analysis.

** Information on trust models provided by Pennsylvania JNET. Contact Chad Firestone, Executive Director, PA JNET; Ph: 717-705-6611; E-mail: chfireston@state.pa.us; or visit JNET's website, <<http://www.pajnet.state.pa.us/pajnet/site/default.asp>>*

Federal Government Landscape

Federal Constraints – With all the talk of what constraints exist at the state level to impede the sharing of information, one must also look at the federal constraints. These include regulations, privacy issues and federal directives. One example involves the prohibition among many federally funded programs against the co-mingling of funds. To share data among agencies that have this prohibition is problematic because the use of one agency's information can be viewed as a use of the lenders' resources, which if funded by the federal government, would involve the co-mingling of funds. Advocacy by the states at the federal level to ease prohibitions of this nature is a first step to easing the federal barriers that impede the sharing of information by state organizations.

Federal Data Sharing Model – There are currently federal efforts to expand the Global Justice XML model into a complete federal XML data-sharing model that will be offered to state and local governments for core data elements. To this end, the National Information Exchange Model (NIEM) is developing partnerships, providing collaborations, and presenting a unified strategy to enable the justice and homeland security community to effectively share key information at all levels—laying the foundation for local, state, tribal, and national interoperability and joining together communities of interest. Every state and local effort should consider this master XML schema as a reference model, as it will eliminate what might turn into a tremendous amount of redundant effort.

What is being done at the federal level to develop data integration governance models?

There is a great deal of effort being expended at all levels of government to seek opportunities for information exchange and to achieve integration. On the federal level, the U.S. Department of Homeland Security (DHS) has the daunting task of bringing together justice organizations, as well as non-justice agencies to promote improved data sharing. In addition, they provide coordination with state, local and tribal organizations.

Also, entities such as the Global Justice Information Sharing Initiative (GLOBAL), which advises the federal government on justice information sharing and integration initiatives; the Bureau of Justice Assistance (BJA), which provides support to local, state, and tribal justice agencies with access to new information sharing technologies; and the Environmental Protection Agency's (EPA's) Central Data Exchange (CDX) that enables more accurate environmental data sharing among state and local governments, industry, tribes, and the EPA; are helping organizations identify the basic dimensions of integration governance and planning. Regardless of the source, the information provided can be of great benefit to those yet to embark on or formulate a governance model.

An illustration of what is being done at the federal level is the Commission on Systemic Interoperability (CSI), a program under the U. S. Department of Health and Human Services (HHS), Office of the National Coordinator for Health Information Technology (ONCHIT), intended to make healthcare information instantly accessible at all times by consumers and their healthcare providers.

The Commission on Systemic Interoperability (CSI)

Authorized by the Medicare Modernization Act, the Secretary of HHS established the CSI to develop a comprehensive strategy for the adoption and implementation of health care information technology standards to make healthcare information instantly accessible at all times, by consumers and their healthcare providers. In developing that strategy, the Commission is considering:

- (1) The costs and benefits of the standards, both financial impact and quality improvement;
- (2) The current demand on industry resources to implement the Medicare Prescription Drug, Improvement, and Modernization Act of 2003 and other electronic standards, including HIPAA standards; and
- (3) The most cost-effective and efficient means for industry to implement the standards.

The Commission, which consists of 11 members appointed by the president, and by house and senate leadership, held its first meeting on January 10, 2005.

CSI is currently developing a report that will provide a comprehensive strategy for creating a health information sharing network; costs and benefits, both financial and medical, of the network, and details on barriers to, and opportunities in, creating the network. The final report will be released on October 24, 2005.

** For additional information, contact Dana Haza, Director, Commission on Systemic Interoperability, National Library of Medicine, National Institutes of Health; Ph: 301-594-7520; E-mail: hazad@mail.nih.gov, or visit the Commission's website at http://www.nlm.nih.gov/csi/csi_home.html*

What CIOs Need to Know

Organizational Culture – CIOs must address the various organizational dynamics in government that impede information sharing if states are ever to make the current visions for transformation a reality within justice, public health, homeland security, environmental protection, social services, and others. The development of a governance structure that takes into consideration the cultures of the participating organizations is key to making this transformation.

Trust – Trust among systems is a fundamental aspect of any integration effort. Trust involves not only the establishment of committed social relationships between organizations and their staff, but the content of what is being shared as well. Each organization has to be confident that the information they obtain from partner organizations for important decisions or incorporating into their mission critical software systems is reliable, relevant, and secure. If any of these characteristics is at risk then the relationship and the integration outcome is also at risk.

Funding – The lack of monies available today is as restrictive as in any time in recent memory. A reliable source of continuous funding must be identified. Since an enterprise integration project is a multi-year effort, CIOs, together with the members of the governance body, must work to secure a funding stream that will span the expected duration of the project. To accomplish this goal, CIOs need to develop both a comprehensive strategic plan and a reasonable business case with which to approach the governor, the legislature, and other entities and individuals who may be able to assist in the creation of a long-term funding mechanism. A funding-related model has

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been the establishment of centralized procurement organizations. These organizations have been created in an attempt to limit redundant purchases of technologies as well as to foster the implementation of those technologies that can be used by many if not all agencies at a specific organizational level in the form of shared services.

Trends – From a technological point of view, enterprise architecture and the use of shared services is becoming more widespread. These developments are consistent with the use of scarce funds to procure a consistent set of technologies that all enterprise participants can make use of and therefore extend their usefulness. On the procurement front, states and other jurisdictions are increasingly using centralized agencies to manage the acquisition of technology. These organizations can also be empowered to review technology infrastructure and suggest applicable common technologies across agencies. Regarding messaging standards, the Global Justice XML Data Model (GJXDM) is morphing into a more broad-based model called the National Information Exchange Model or NIEM. The new model is being jointly backed by the U.S. Department of Justice (DOJ) and the U.S. Department of Homeland Security (DHS) to further ensure national standards for information sharing are followed. NIEM is composed of three parts; core data components, reusable XML based exchange packages, and business process models for information sharing. More information can be found at <http://www.niem.gov/>.

Where Can I Find Additional Resources?

The Bureau of Justice Assistance (BJA)

- A component of the Office of Justice Programs (OJP) and the U.S. Department of Justice; BJA provides leadership and services in criminal justice policy development to support local, state, and tribal justice strategies to enhance access and use new information technologies. <<http://www.ojp.usdoj.gov/BJA/>>

Center for Technology in Government (CTG)

- CTG works with government to develop information strategies that foster innovation and enhance the quality and coordination of public services. <<http://www.ctg.albany.edu>>
- CTG has created a document called “*And Justice for All*,” which is a primer on justice integration. <http://www.ctg.albany.edu/publications/guides/and_justice_for_all>

Central Data Exchange (CDX)

- An initiative of the U.S. Environmental Protection Agency (EPA), CDX enables fast, efficient and more accurate environmental data submissions from state and local governments, industry and tribes to the EPA and participating program offices. <<http://www.epa.gov/cdx/>>

eJusticeNY

- eJusticeNY is a browser-based portal designed to give the criminal justice community a single point of access to computerized criminal justice information within and beyond New York State. <<http://criminaljustice.state.ny.us/ojis/ejusticeinfo.htm>>

Global Justice Information Sharing Initiative (GLOBAL)

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- Under the auspices of the Office of Justice Programs (OJP) and the U.S. Department of Justice, Global is a "group of groups," representing more than thirty independent organizations spanning the spectrum of law enforcement, judicial, correctional, and related bodies. Member organizations participate in Global out of shared responsibility and shared belief that, together, they can bring about positive change in inter-organizational communication and data sharing. <http://it.ojp.gov/topic.jsp?topic_id=8>

Government Accountability Office (GAO)

- GAO exists to support the Congress in meeting its Constitutional responsibilities and to help improve the performance and ensure the accountability of the federal government for the benefit of the American people. Links to several GAO reports on information sharing can be located by doing a keyword search on GAO's website by using the keywords "information sharing" and any specific agency or topical area like "homeland security." <<http://www.gao.gov/>>

Integrated Justice Information Systems (IJIS) Institute

- The mission of the IJIS Institute is to apply the expertise of industry to assist justice agencies in the innovative use of advanced technologies to better share information in a way that benefits industry, the public sector, and society as a whole. <<http://www.ijis.org/servlet/tsi.Traction?type=home>>

National Association of Counties (NACo)

- NACo's mission is to ensure that the nation's 3,066 counties are heard and understood in the White House and the halls of Congress on a wide variety of issues. NACo's membership totals more than 2,000 counties, representing over 80 percent of the nation's population. <<http://www.naco.org>>

NASCIO's Perspectives – Government Information Sharing: Calls to Action (March 2005)

- NASCIO is pleased to announce the release of a new publication on the subject of information sharing. NASCIO has pulled together interviews and articles from a variety of contributors from integrated justice, homeland security, environmental protection, transportation, public health and economic development. Perspectives includes discussions from federal, state and county government. This report presents barriers to information sharing and the "Calls to Action" to overcome these barriers. <<https://www.nascio.org/publications/index.cfm#perspectives>>

National Governors Association (NGA)

- NGA provides governors and their senior staff members with services that range from representing states on Capitol Hill and before the Administration on key federal issues to developing policy reports on innovative state programs and hosting networking seminars for state government executive branch officials. <<http://www.nga.org/>>

National Information Exchange Model (NIEM)

- NIEM is an interagency initiative that provides the foundation and building blocks for national-level interoperable information sharing and data exchange. <<http://www.niem.gov/>>

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New Jersey Data Management Council (DMC)

- The State of New Jersey formed the DMC to provide a systematic review of enterprise data policies and practices. The council developed a set of standards and has oversight by the chief information officer (CIO) and technical support from the New Jersey Office of Information Technology (OIT). Contact Dan Paolini, Director, Data Management Services, New Jersey Office of Information Technology (OIT); Ph: 609-777-3771; E-mail: daniel.paolini@oit.state.nj.us; or visit OIT's website, <<http://www.state.nj.us/it/>>

Office of the National Coordinator for Health Information Technology (ONCHIT)

- The mission of ONCHIT is to implement the President's vision for widespread adoption of interoperable electronic health records (EHRs) within 10 years; as outlined in Executive Order #13335 issued in April 2004. <<http://www.os.dhhs.gov/healthit/>>

Pennsylvania's Justice Network (JNET)

- JNET is a secure system that allows users to access criminal data, mug shots, driver's license photos and other law enforcement data, that is available to federal and state agencies and local police departments. Contact Chad Firestone, Executive Director, PA JNET, Ph: 717-705-6611; E-mail: chfireston@state.pa.us; or visit JNET's website, <<http://www.pajnet.state.pa.us/pajnet/site/default.asp>>

SEARCH – The National Consortium for Justice Information Statistics

- SEARCH is a nonprofit membership organization, created by and for the states, dedicated to improving the criminal justice system and the quality of justice through better information management, the effective application of information and identification technology, and responsible law and policy. <<https://www.search.org/>>